



Dart Aerospace Ltd.  
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3

**D212-664-101TRN**  
**Job Sheet 168759-B**



**Part No:** D212-664-101TRN

**Job Qty:** 1 ea

**Part Name:** Crosstube Turning Detail



**Part Weight:** 0 lbs

**Status:** Scheduled

**Priority:** Medium

**Job Created:** 11/22/17

**Job Tracking No:**

**Due Date:** 12/4/17

**Created By:** Linda Lacelle

**Type:** Stock

**Description:**

**Ship Via:**

### Bill of Materials

### Job Routing

| Op No | Operation          | Qty   | Start Date | Due Date | Standard  |         | Workcenter/Supplier   |           | Sign-off |
|-------|--------------------|-------|------------|----------|-----------|---------|-----------------------|-----------|----------|
|       |                    |       |            |          | Setup hrs | Run Hrs | Workcenter / Supplier | Lead Time |          |
| 90    | Start up Operation | 1 Ea  | 12/1/17    | 12/1/17  | 0.00      | 0.00    | Start Up Crosstubes   |           | PMP      |
| 100   | Mori Seiki         | 1 pcs | 12/2/17    | 12/2/17  | 4.40      | 2.38    | Mori Seiki TL-40      |           | PMP      |
| 110   | QC                 | 1 pcs | 12/2/17    | 12/2/17  | 0.00      | 0.00    | QC2                   |           | PMP      |
| 120   | Mori Seiki         | 1 pcs | 12/2/17    | 12/2/17  | 0.00      | 2.38    | Mori Seiki TL-40      |           | PMP      |
| 130   | QC                 | 1 pcs | 12/2/17    | 12/2/17  | 0.00      | 0.00    | QC2                   |           | PMP      |
| 140   | QC                 | 1 pcs | 12/2/17    | 12/2/17  | 0.00      | 0.00    | QC8                   |           | 47       |
| 145   | Crosstubes         | 1 pcs | 12/2/17    | 12/2/17  | 0.00      | 0.68    | Crosstube             |           | 9-85 PMP |
| 150   | HandFXtube         | 1 pcs | 12/4/17    | 12/4/17  | 0.00      | 1.00    | Crosstube             |           | OPZ      |
| 160   | QC                 | 1 pcs | 12/4/17    | 12/4/17  | 0.00      | 0.00    | QC7                   |           | OPZ      |
| 170   | Packaging          | 1 pcs | 12/4/17    | 12/4/17  | 0.00      | 0.00    | Packaging3            |           | OPZ      |
| 180   | QC21-SA            | 1 Ea  | 12/4/17    | 12/4/17  | 0.00      | 0.00    | QC21                  |           | OPZ      |

Part Op 100 - 1- Fill tube with sand & install plugs 212-141 on both ends as per Folio FA113 3- Turn first taper section on both side  
Descriptions: as per folio FA113

120 - 1- Turn second taper on both side 4- Scribe part # and batch # using vibrating stylus on the cuff as per Dwg D212-664-141

145 - GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.

150 - 1- handfinish X-TUBE INSIDE AND OUT

170 - LOCATION : LG014

### Job Allocations

| Operation             | Component Part | Required | Inventory | Allocated | Std Qty |
|-----------------------|----------------|----------|-----------|-----------|---------|
| 90-Start up Operation | D6005-128      | 1        | 97        | 0         | 0       |

B123963

### Part Specifications

Specifications could not be found.

Plex 11/22/17 1:12 PM dart.lacelle.linda

**DART**  
AEROSPACE  
**S015857**

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**Crosstube Turning Detail**

**PART NO: D212-664-101TRN**

**Revision:**

**Operation: Start up Operation**

**Change No:**

**Mfg Date: 11/30/17**

**Job No: 168759-B**



|                                                               |                                  |
|---------------------------------------------------------------|----------------------------------|
| <b>DART AEROSPACE LTD</b>                                     | <b>Work Order:</b> 168759-B      |
| <b>Description:</b> Crosstube Assembly (205/212/412 High Fwd) | <b>Part Number:</b> D212-664-141 |
| <b>Inspection Dwg:</b> D212-664-141 Rev: E                    | <b>Page 1 of 2</b>               |

### FIRST ARTICLE INSPECTION CHECKLIST

|        | Inspection Sheet Drawing Dimension | Tolerance     | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|--------|------------------------------------|---------------|------------------|--------|--------|----------------------|----------|
| SIDE A | 0.200                              | +/-0.010      | .200             | ✓      |        | VERNO8               |          |
|        | R0.063                             | +/-0.010      | .063             | ✓      |        | RG                   |          |
|        | 2.740                              | +0.005/-0.000 | 2.744            | ✓      |        | VERNO8               |          |
|        | 5.097                              | +/-0.030      | 5.410            | ✓      |        |                      |          |
|        | 2.304                              | +0.005/-0.000 | 2.3085           | ✓      |        |                      |          |
|        | 2.340                              | +0.005/-0.000 | 2.345            | ✓      |        |                      |          |
|        | 2.398                              | +0.005/-0.000 | 2.403            | ✓      |        |                      |          |
|        | 2.448                              | +0.005/-0.000 | 2.453            | ✓      |        |                      |          |
|        | 2.498                              | +0.005/-0.000 | 2.502            | ✓      |        |                      |          |
|        | 2.549                              | +0.005/-0.000 | 2.554            | ✓      |        |                      |          |
|        | 2.599                              | +0.005/-0.000 | 2.604            | ✓      |        |                      |          |
|        | 2.671                              | +0.005/-0.000 | 2.676            | ✓      |        |                      |          |
|        | 2.701                              | +0.005/-0.000 | 2.706            | ✓      |        |                      |          |
|        |                                    |               |                  |        |        |                      |          |
| SIDE B | 0.200                              | +/-0.010      | .200             | ✓      |        | VERNO8               |          |
|        | R0.063                             | +/-0.010      | .063             | ✓      |        | RG                   |          |
|        | 2.740                              | +0.005/-0.000 | 2.743            | ✓      |        | VERNO8               |          |
|        | 5.097                              | +/-0.030      | 5.013            | ✓      |        |                      |          |
|        | 2.304                              | +0.005/-0.000 | 2.308            | ✓      |        |                      |          |
|        | 2.340                              | +0.005/-0.000 | 2.3445           | ✓      |        |                      |          |
|        | 2.398                              | +0.005/-0.000 | 2.403            | ✓      |        |                      |          |
|        | 2.448                              | +0.005/-0.000 | 2.453            | ✓      |        |                      |          |
|        | 2.498                              | +0.005/-0.000 | 2.5015           | ✓      |        |                      |          |
|        | 2.549                              | +0.005/-0.000 | 2.554            | ✓      |        |                      |          |
|        | 2.599                              | +0.005/-0.000 | 2.604            | ✓      |        |                      |          |
|        | 2.671                              | +0.005/-0.000 | 2.676            | ✓      |        |                      |          |
|        | 2.701                              | +0.005/-0.000 | 2.706            | ✓      |        |                      |          |
|        | 126.514                            | +/-0.020      | 126.514          | ✓      |        | TAPE                 |          |

SIDE A  
R.063  
R.500

±.010  
±.010

.063  
.5

✓  
✓

RG  
RG

SIDE B  
R.063  
R.500

±.010  
±.010

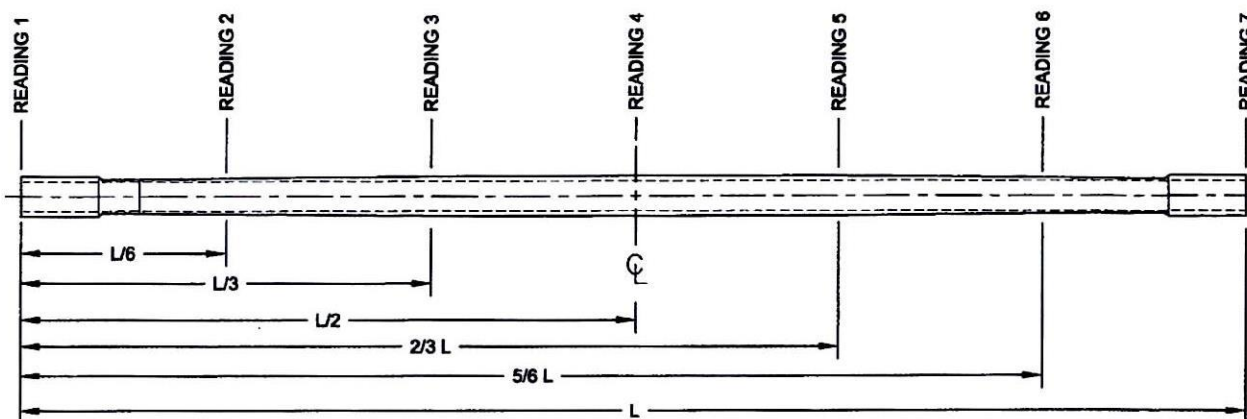
.063  
.5

✓  
✓

RG  
RG

|                                                               |                                  |                    |
|---------------------------------------------------------------|----------------------------------|--------------------|
| <b>DART AEROSPACE LTD</b>                                     | <b>Work Order:</b> 168759-B      |                    |
| <b>Description:</b> Crosstube Assembly (205/212/412 High Fwd) | <b>Part Number:</b> D212-664-141 |                    |
| <b>Inspection Dwg:</b> D212-664-141 <b>Rev:</b> E             |                                  | <b>Page 2 of 2</b> |

### WALL THICKNESS MEASUREMENT



| Location                | WALL THICKNESS MEASUREMENT (IN) |     |     |     | Deviation<br>$\Delta w$<br>(max-min) | TOLERANCE |
|-------------------------|---------------------------------|-----|-----|-----|--------------------------------------|-----------|
|                         | w1                              | w2  | w3  | w4  |                                      |           |
| READING 1<br>L= 0"      | 371                             | 381 | 386 | 385 | .015                                 | 0.048"    |
| READING 2<br>L= 21.09   | 232                             | 238 | 245 | 248 | .016                                 |           |
| READING 3<br>L= 42.17   | 352                             | 354 | 358 | 359 | .007                                 |           |
| READING 4<br>L= 63.25   | 382                             | 382 | 385 | 389 | .007                                 |           |
| READING 5<br>L= 84.34   | 361                             | 350 | 353 | 366 | .016                                 |           |
| READING 6<br>L= 105.43  | 256                             | 237 | 231 | 252 | .025                                 |           |
| READING 7<br>L= 126.514 | 383                             | 392 | 380 | 393 | .013                                 |           |

#### Calibration Result

Actual Block Thickness: 200-400

Sitiescan 250 Measured Thickness: 200-400

|                         |                               |                              |
|-------------------------|-------------------------------|------------------------------|
| <b>Measured by:</b> PMP | <b>Audited by:</b> DAS 47 980 | <b>Preliminary Approval:</b> |
| <b>Date:</b> 2017-11-30 | <b>Date:</b> 17-12-16         | <b>Date:</b>                 |

| Rev | Date     | Change                             | Revised by | Approved |
|-----|----------|------------------------------------|------------|----------|
| C   | 07.05.28 | Dwg Rev updated (P/O D412-664-101) | KJ/JLM     |          |
| D   | 10.02.02 | Dimension 126.514 was 126.51       | KJ         |          |
| E   | 12.06.04 | Wall thickness form added          | KJ         |          |
| F   | 14.06.05 | Dwg Rev updated                    | KJ         |          |



| Item | Qty<br>-141 | Qty<br>-141B | Qty<br>-141F | Part Number     | Description                                             |
|------|-------------|--------------|--------------|-----------------|---------------------------------------------------------|
| 1    | X           |              |              | D212-664-141    | CROSSTUBE ASSEMBLY (206/212/412 HIGH FWD)               |
| 2    |             | X            |              | D212-664-141B   | CROSSTUBE ASSEMBLY (214 HIGH FWD)                       |
| 3    |             |              | X            | D212-664-141F   | CROSSTUBE ASSEMBLY (206/212/412 HIGH FWD)<br>(ANODIZED) |
| 4    | 1           | 1            | 1            | D6005-128       | CROSSTUBE                                               |
| 5    | 2           |              | 2            | D2893-1         | SUPPORT                                                 |
| 6    | 4           | 4            | 4            | D3595-083-450   | RUBBER CUSHION                                          |
| 7    |             | 2            |              | D5017-1         | SUPPORT                                                 |
| 8    | 4           | 4            | 4            | MS21920-25      | CLAMP (OR MS21920-26)                                   |
| 9    | A/R         | A/R          | A/R          | PROSEAL 890 B-2 | SEALANT, AMS-S-8802 CLASS B-2                           |

#### GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6005-128  
FINISHED LENGTH = 128.514±0.020
- FINISH -141 & -141B: a) CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
b) PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
c) MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2 / C6-3, HATCHED AREA)  
d) PAINT OUTSIDE PER DART QSI 005 4.2  
e) REMOVE MASKING AND APPLY MATTE CLEAR COAT
- FINISH -141F: a) ANODIZE PER MIL-A-8625, TYPE II, CLASS 1.  
b) ALODINE (DO NOT ETCH) PER QSI 005 4.1.2  
c) PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
d) MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2 / C6-3, HATCHED AREA)  
e) PAINT OUTSIDE PER DART QSI 005 4.2  
f) REMOVE MASKING AND APPLY MATTE CLEAR COAT

**\*NOTE:** BETWEEN FINISHING OPERATIONS EXTREME CARE MUST BE TAKEN NOT TO CONTAMINATE OR DAMAGE FINISHED SURFACES.

- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS
- WEIGHT: D212-664-141/-141B/-141F = 33.8 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.

#### MACHINING

- RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.

#### BENDING

- BEND PROGRESSIVELY WITH A MINIMUM OF 3 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7.2% (BASED ON O.D.) IN LOWER HALF OF R35.5 BEND AND 6% (BASED ON O.D.) ON REMAINING TUBE.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.

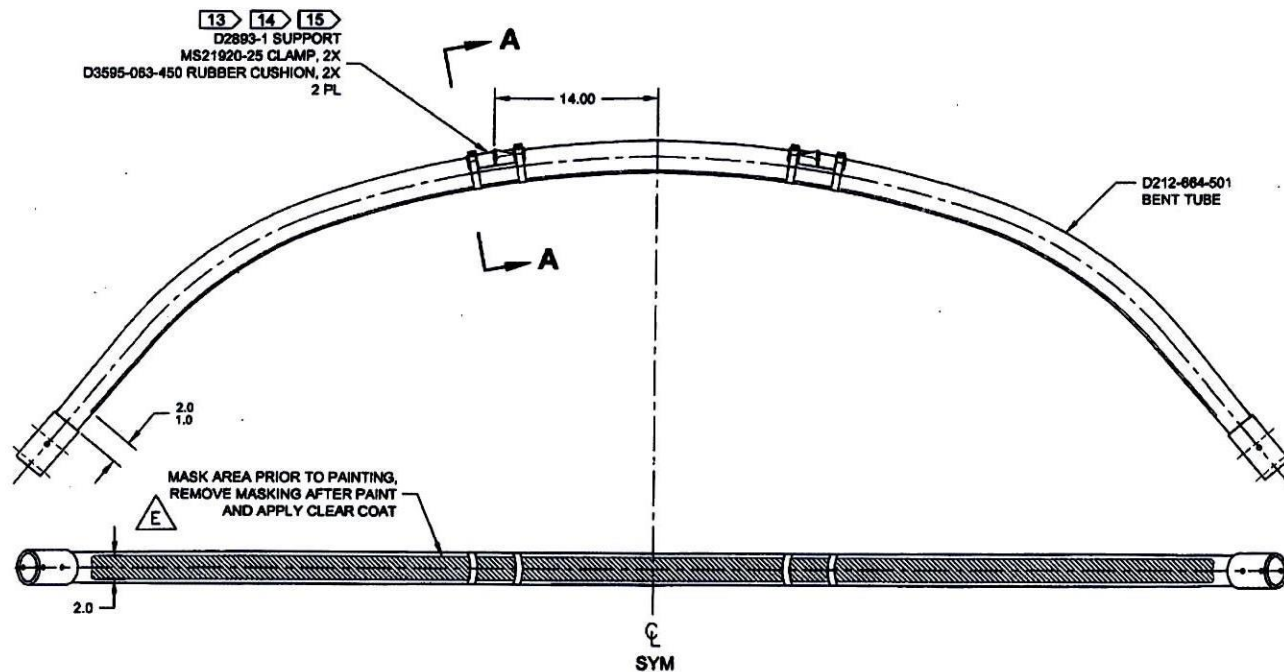
#### ASSEMBLY

- TO INSTALL D2893-1 / D5017-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-083-450 RUBBER CUSHIONS TO SECURE THE SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE ON TOP SIDE OF CROSSTUBE.
- TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

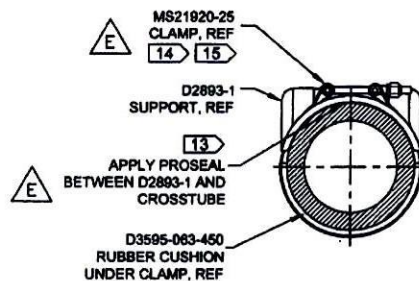
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|            |                                                                                                                                                                                                                                                                                                          |    |          |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----------|
| E          | ADD -141F. D5017-1 WAS D2893-1 (-141B). PROSEAL WAS MAGNOBOND, NOTE 2: ADD INSPECTION WINDOW, NOTE 11: ALLOW 7.2% CRUSH, NOTE 15: ADD 72HR CURE AND RETORQUE FOR PROSEAL, ADD SHEET 3, CLAMPS REVERSED TO PREVENT CHAFING (87-2, 87-3), BEND HEIGHT TOL. NOW 0.25 WAS 0.13 (C1-3), INCORP. DEO D-1/-2/-3 | CP | 14.04.01 |
| D          | REFORMAT/REVISE GENERAL NOTES/PART LIST: REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; ADD -141B (ZN B4-2, D4-2); REMOVED REF & ADD TOLERANCES (ZN B4-3, C6-3, C6-3 & B6-3); RELOCATED FLAG #6 PER PAR 08-046 (ZN A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4           | RF | 09.09.30 |
| C          | REMOVE -651 ABRASION STRIP; ADD MAGNOBOND 8388, CUSHION, REVERSE CLAMPS                                                                                                                                                                                                                                  | PH | 07.03.08 |
| B          | ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES                                                                                                                                                                                                                                                        | PH | 05.02.04 |
| A          | NEW ISSUE                                                                                                                                                                                                                                                                                                | CP | 00.12.12 |
| REV.       | DESCRIPTION                                                                                                                                                                                                                                                                                              | BY | DATE     |
| DESIGN     |                                                                                                                                                                                                                                                                                                          |    |          |
| DRAWN      |                                                                                                                                                                                                                                                                                                          |    |          |
| CHECKED    |                                                                                                                                                                                                                                                                                                          |    |          |
| MFG. APPR. |                                                                                                                                                                                                                                                                                                          |    |          |
| APPROVED   |                                                                                                                                                                                                                                                                                                          |    |          |
| DE APPR.   |                                                                                                                                                                                                                                                                                                          |    |          |
| DATE       | 14.04.01                                                                                                                                                                                                                                                                                                 |    |          |

|                                                                                                                                                                                                                                                                                  |                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>DART AEROSPACE LTD</b><br>HAWKESSBURY, ONTARIO, CANADA                                                                                                                                                                                                                        |                        |
| DRAWING NO.<br>D212-664-141                                                                                                                                                                                                                                                      | REV. E<br>SHEET 1 OF 5 |
| TITLE<br>XTUBE ASS'Y (205/212/412 HI FWD)                                                                                                                                                                                                                                        | SCALE<br>NTS           |
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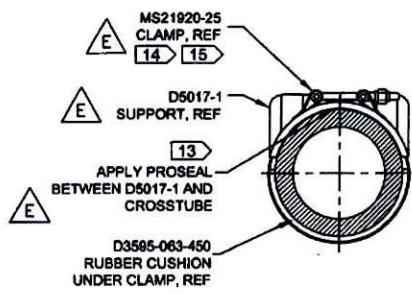
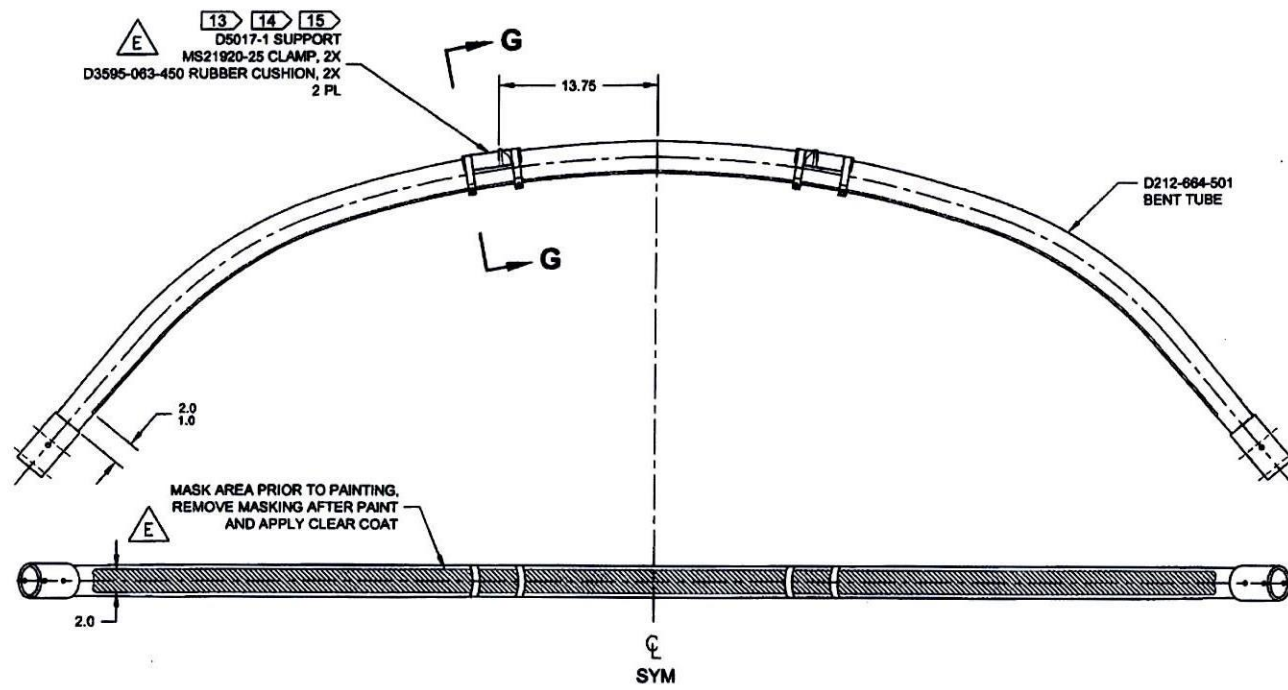
**D212-664-141/-141F  
ASSEMBLY DETAIL**



**SECTION A-A**  
SCALE 4X

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|                                                                                                                                                                                                                                    |                                                                                       |                                        |              |
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| DRAWN                                                                                                                                                                                                                              |  | HAWKESBURY, ONTARIO, CANADA            |              |
| CHECKED                                                                                                                                                                                                                            |  | DRAWING NO.                            | REV. E       |
| MFG. APPR.                                                                                                                                                                                                                         |  | D212-664-141                           | SHEET 2 OF 5 |
| APPROVED                                                                                                                                                                                                                           |  | TITLE                                  | SCALE        |
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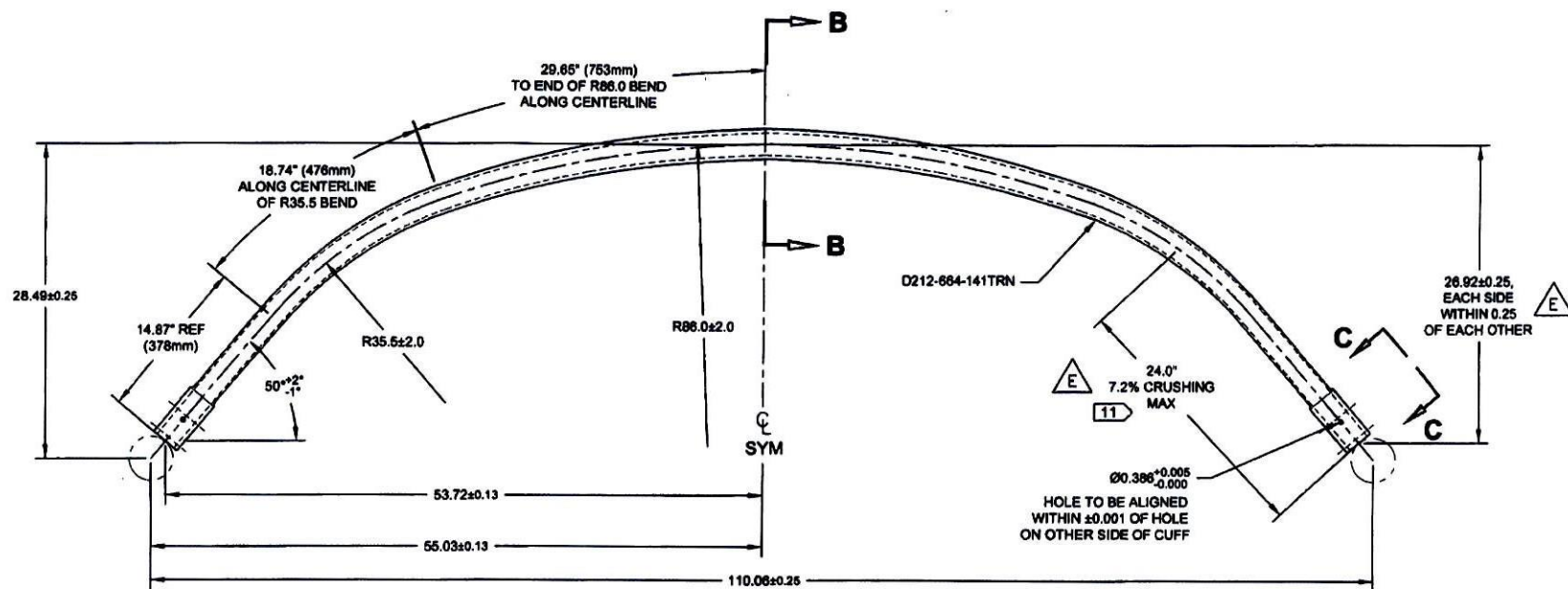
**SECTION G-G**  
SCALE 4X

**D212-664-141B**  
**ASSEMBLY DETAIL**

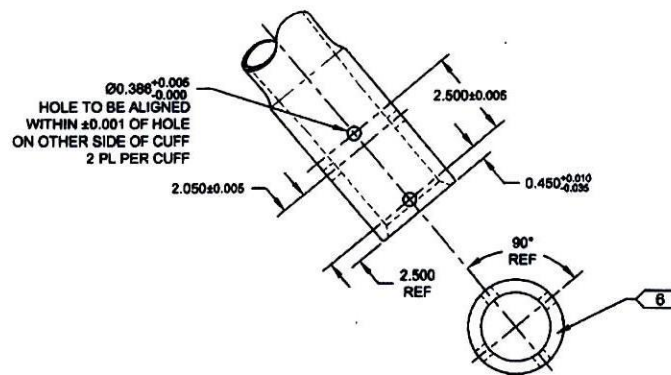
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| DESIGN     |  | <b>DART AEROSPACE LTD</b>                                                                                                                                                                                                                                             |              |
| DRAWN      |  | HAWKESBURY, ONTARIO, CANADA                                                                                                                                                                                                                                           |              |
| CHECKED    |  | DRAWING NO.                                                                                                                                                                                                                                                           | REV. E       |
| MFG. APPR. |  | D212-664-141                                                                                                                                                                                                                                                          | SHEET 3 OF 5 |
| APPROVED   |  | TITLE                                                                                                                                                                                                                                                                 | SCALE        |
| DE APPR.   |  | XTUBE ASS'Y (205/212/412 HI FWD)                                                                                                                                                                                                                                      | NTS          |
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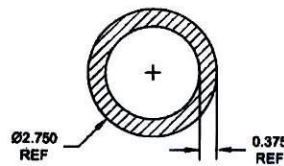




**D212-664-501**  
**BENDING AND DRILLING DETAIL** 11



**VIEW C-C: CUFF DETAIL**  
SCALE 3X



**SECTION B-B**  
SCALE 4X

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|                                                                                                                                                                                                                                    |           |                                        |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------|--------------|
| DESIGN                                                                                                                                                                                                                             | <i>JD</i> | <b>DART AEROSPACE LTD</b>              |              |
| DRAWN                                                                                                                                                                                                                              | <i>JD</i> | HAWKESBURY, ONTARIO, CANADA            |              |
| CHECKED                                                                                                                                                                                                                            | <i>JD</i> | DRAWING NO.                            | REV. E       |
| MFG. APPR.                                                                                                                                                                                                                         | <i>JD</i> | D212-664-141                           | SHEET 4 OF 5 |
| APPROVED                                                                                                                                                                                                                           | <i>JD</i> | TITLE                                  | SCALE        |
| DE APPR.                                                                                                                                                                                                                           | <i>JD</i> | XTUBE ASSY (205/212/412 HI FWD)        | NTS          |
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